DACW-33-85-D-0011 Delivery Order 0016
Riverdale Dike, West Springfield, MA

FILE COPY

ATLANTIC TESTING LABORATORIES, LIMITED

Sustaining Member—N.Y.S. Society of Professional Engineers

atl

Box 29
Canton, N.Y. 13617
(315) 386-4578

Box 356
Cicero, N.Y. 13039
(315) 699-5281

October 31, 1986

U. S. Army Corps of Engineers
New England Division
424 Trapelo Road
Waltham, MA 02254-9149

Attn: Chief, Engineering Division, NEDED

Re: Subsurface Investigation
Riverdale Dike, West Springfield, MA
Contract DACW-33-85-D-0011
Delivery Order No. 0016
ATL Report No. CD018-1-10-86

Gentlemen:

In accordance with Delivery Order No. 0016, dated 15 September 1986, attached is one final copy of our Engineering Report for the subsurface investigation performed at the Riverdale Dike, West Springfield, MA.

By copy of this letter, we are also transmitting two copies of this report to the Chief of the Geotechnical Engineering Branch.

If you have any questions or comments, please do not hesitate to call.

Respectfully submitted,

Spencer F. Thew, P.E./L.S.
President

SFT/TAB/smf

encs.

2 cc: Chief, Geotechnical Engineering Branch, NEDED-GF

SECTION 1

SUBSURFACE INVESTIGATION
RIVERDALE DIKE
WEST SPRINGFIELD, MA

CONTRACT DACW 33-85-D-0011
CONTRACTING OFFICER:
Edward D. Hammond, LTC, CE
28 June 1985

Delivery Order No. 0016
15 September 1986

PREPARED FOR: U. S. Army Corps of Engineers
New England Division
424 Trapelo Road
Waltham, MA 02254-9149

PREPARED BY: Atlantic Testing Laboratories, Limited
P. O. Box 29
Canton, NY 13617

October 9, 1986

ATL Report No. CD018-1-10-86

SECTION 2

TABLE OF CONTENTS

SECTION 3

SCOPE OF INVESTIGATION

a. Delivery Order No. 0016

CHECKED BOX APPLIES: [X] ORDER FOR SUPPLIES OR SERVICES [ ] REQUEST FOR QUOTATIONS NO

RETURN ____ COPIES OF THIS QUOTE BY

(THIS IS NOT AN ORDER. See DD Form 1155r)

PAGE 1 OF 2

5. CERTIFIED FOR NATIONAL DEFENSE UNDER DMS REG 1

DO

1. CONTRACT/PURCHASE NO	2. DELIVERY ORDER NO	3. DATE OF ORDER	4. REQUISITION/PURCH REQUEST NO
DACW33-85-D-0011	0016	86 SEP 15	GEB 86-87

6. ISSUED BY: Dept. of the Army CODE
New England Division, Corps of Engineers
424 Trapelo Road
Waltham, Massachusetts 02254-9149
BUYER/SYMBOL: APIDIANAKIS/NEDSD-P Telephone: Area Code 617-647-8207

7. ADMINISTERED BY
PROJECT: Geotechnical Exploratory Work and Related Services, Various Locations in New England and New York

8. DELIVERY FOR: [X] DEST [ ] OTHER (See Schedule if other)

9. CONTRACTOR/OFFEROR CODE ____ FACILITY CODE ____

NAME AND ADDRESS
Atlantic Testing Laboratories, Ltd.
P. O. Box 29
Canton, New York 13617

10. DELIVER TO FOB POINT BY
In accordance with Paragraph 7 of Attachment No.

11. CHECK IF BUSINESS IS: [X] SMALL [ ] SMALL DISADVANTAGED [ ] WOMEN-OWNED

12. DISCOUNT TERMS

13. Accounting Office

14. SHIP TO CODE
Services for:
U. S. Army Engineer Div., New England
Geotechnical Engineering Branch
424 Trapelo Road
Waltham, MA 02254-9149

15. PAYMENT WILL BE MADE BY
Fina
Issu

MARK ALL PACKAGES AND PAPERS WITH CONTRACT OR ORDER NUMBER

REFERENCE:
MD BE845

16. TYPE OF ORDER
DELIVERY [X] This delivery order is subject to instructions contained on this side of form only and to terms and conditions of above numbered contract.
PURCHASE [ ] Reference your
General Provisions of Purchase Order on DD Form 1155r (EXCEPT CLAUSE NO.

Steve Nunes x7721

IS CHECKED), special provisions

10 USC 2304(a)(3) or as specified in the schedule if within the U.S., its possessions or Puerto Rico, if otherwise

[ ] If checked, Additional General Provisions apply. Supplier shall sign "Acceptance" on DD Form 1155r and

r U.S. purchases IF THIS BOX [ ] authority of

SBSA

17. ACCOUNTING AND APPROPRIATION DATA/LOCAL USE
96X3122 Construction General
BE845304NOPA000 (MD) $6,835.00
Contract

Richard Day 9/10/86

GEB
AE/PS Co
Status
SO;EJA

18. ITEM NO.	19. SCHEDULE OF SUPPLIES/SERVICES	20. QUANTITY ORDERED/ ACCEPTED*	21. UNIT	22. UNIT PRICE	23. AMOUNT
Line	Furnish necessary services, equipment and personnel to perform three borings at Riverdale Dike, West Springfield, MA, in accordance with instructions contained in Attachment No. 1.	APPROX.			ESTIMATED
1.2	Geotechnical Inspector	40	HR	$40.00	$1,600.00
1.3	Per Diem - Overnight Stay	4	DAY	45.00	180.00
1.4	Mileage from Waltham, MA and Return	174	MI	.35	60.90
					ESTIMATED

* If quantity accepted by the Government is same as quantity ordered, indicate by √ mark. If different, enter actual quantity accepted below quantity ordered and encircle.

24. UNITED STATES OF AMERICA BY: THOMAS A. RHEN, Colonel, CE, Division Engineer (CONTRACTING/ORDERING OFFICER) XXXX

25. TOTAL ~~$6,835.00~~

29. DIFFERENCES

26. QUANTITY IN COLUMN 20 HAS BEEN
[ ] INSPECTED [ ] RECEIVED [ ] ACCEPTED, AND CONFORMS TO THE CONTRACT EXCEPT AS NOTED

DATE ____ SIGNATURE OF AUTHORIZED GOVERNMENT REPRESENTATIVE

27. SHIP. NO. [ ] PARTIAL [ ] FINAL

28. D.O. VOUCHER NO.

30. INITIALS

31. PAYMENT [ ] COMPLETE [ ] PARTIAL [ ] FINAL

32. PAID BY

33. AMOUNT VERIFIED CORRECT FOR

34. CHECK NUMBER

35. BILL OF LADING NO.

36. I certify this account is correct and proper for payment

DATE ____ SIGNATURE AND TITLE OF CERTIFYING OFFICER

37. RECEIVED AT	38. RECEIVED BY	39. DATE RECEIVED	40. TOTAL CONTAINERS	41. S/R ACCOUNT NUMBER	42. S/R VOUCHER NO.

STANDARD FORM 36, JULY 1966 GENERAL SERVICES ADMINISTRATION FED PROC REG (41 CFR) 1-16.101 *Exception Approved: March, 1977*	**CONTINUATION SHEET**	REF. NO. OF DOC. BEING CONTD Delivery Order No. 0016 DACW33-85-D-0011	PAGE 2 OF 2

NAME OF OFFEROR OR CONTRACTOR

Atlantic Testing Laboratories, Ltd.

Contract Line ITEM NO.	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		APPROX.			ESTIMATED
2.1	Geotechnical Report	1	JOB	60% of 1.2	$960.00
6.1	Mobilization and Demobilization	1	JOB	$700.00	700.00
6.2	Mileage from/to Waltham, MA	174	MI	1.15	200.10
6.5	Standby time/on site moves	8	HR	75.00	600.00
13.1	0-30 ft. depth	60	EA	13.00	780.00
13.2	31-50 ft. depth	14	EA	16.00	224.00
18.2	HX and 6 inch size	45	LF	28.00	1,260.00
22.3	NWX size and/or NWM	6	LF	45.00	270.00

ATTACHMENT 1

CONTRACT NO. DACW33-85-D-0011

DELIVERY ORDER NO. 0016

EXPLORATION INSTRUCTIONS

PROJECT: Modifications to Pumping Station

SITE: Riverdale Dike, West Springfield, MA

1. SCOPE OF INVESTIGATIONS

a. General.

Locate and execute two 30-foot borings and one 50-foot boring in the crest and toes of the Riverdale flood control dike in the vicinity of the Riverdale Pumping Station.

b. Explorations.

(1) All explorations shall be located by the field inspector by taping from surveyed features at the locations shown on the Site Plan (Attachment 3). Explorations are located along a line parallel with the existing outlet conduit and 40 feet east of the conduit centerline. The ground elevation at each boring shall be determined by the inspector based on the elevation of the top of the outlet structure (see Attachment 3). The inspector shall locate underground utilities (abandoned sanitary line and active toe drain) at the site prior to starting toe borings.

(2) The borings at the dike toes, FD-A and FD-C shall be 30 feet in depth. The boring in the dike crest, FD-B shall be 50 feet in depth. If refusal is encountered, NWX coring shall be employed but shall not be advanced deeper than the above specified depths or break-through, whichever is deeper. Refusal is defined as 50 blows without penetration or bouncing refusal. The first 15 feet of each hole shall be cased utilizing HX casing.

(3) Following completion of each boring, casing shall be removed and the borehole filled with bentonite-cement grout to six inches below the ground surface. The remainder of the hole shall be backfilled with topsoil and tamped. Topsoil may be dug from the boring location prior to starting the boring and saved for final backfilling.

(4) Sampling in the borings shall be done by the SPT method using a 140 lb. hammer and a free fall of 30 inches. Continuous SPT sampling shall be performed in each boring.

(5) A geotechnical inspector shall act as field inspector for the explorations. The inspector shall provide telephone reports to Mr. Paul L'Heureux, Corps of Engineers at tel. (617) 647-8597 at least once each working day. The alternate point of contact is Mr. Timothy Beauchemin, tel. (617) 647-8365.

(6) All samples shall be delivered to the Corps of Engineers Headquarters in Waltham, Massachusetts. Sample delivery shall be coordinated with the Director, NED Materials and Water Quality Laboratory at tel. 617-647-8367/8392.

2. SITE CONDITIONS.

The proposed explorations are in the crest and toe areas of the Riverdale Dike in the vicinity of the Riverdale Pumping Station. the materials in both the dike and foundation soils are expected to range from silt to gravel with gravels occurring principally in the dike structure. Bedrock is not expected within the depths of the explorations.

3. RIGHTS-OF-ENTRY.

Rights-of-entry will be arranged by the Government through the Town of West Springfield.

4. COORDINATION

The Contractor shall give five days advance notice to Wally Wyman, Town Engineer for West Springfield at (413) 781-7550. Paul L'Heureux, Corps of Engineers, (617) 647-8597, shall be contacted five days prior to the start of work and at least once a day by the geotechnical inspector to report on the progress of the work and materials encountered.

5. EXPLORATION NUMBERS.

The drive boring locations as shown on Attachment No. 3 and designated FD-A through FD-C shall be redesignated FD-86-1 through FD-86-3 in order of their completion. The numbers shall be indicated on the boring logs and shown on a plan of explorations.

6. GOVERNMENT REVIEW

The Government will review the draft submittal of geotechnical report as well as the completed work. Subsequent to such review, the Contractor shall accomplish any correction which may be directed as the result of the Government review.

7. COMPLETION SCHEDULE

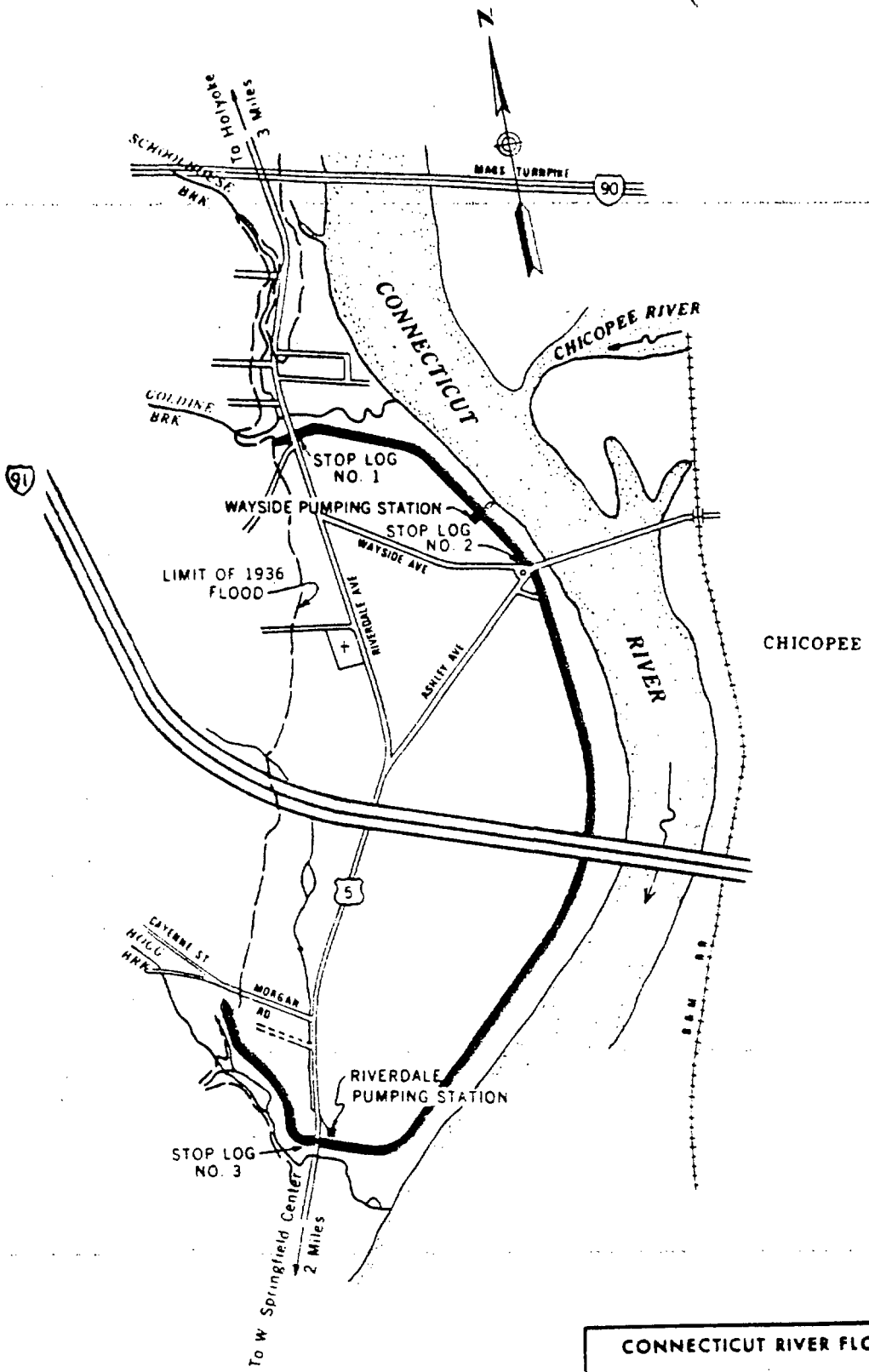
Services under this delivery order shall start within fifteen days after the receipt of the delivery order. Duration of the drilling effort is estimated to be four calendar days. The geotechnical report shall be submitted in draft form for review, to the Government, postmarked no later than seven calendar days after completion of the field work.

Government review will take approximately ten calendar days from receipt of draft report. The final geotechnical report shall be submitted postmarked no later than seven calendar days after receipt of draft report with Government comments.

8. QUALITY CONTROL

You will be held responsible for the quality of the maps submitted and for all damages caused the Government as a result of your negligence in the performance of any services furnished under the contract.

Although submissions required by your contract are technically reviewed by the Government, it is emphasized that your work must be prosecuted using proper internal controls and review procedures. The letter of transmittal for each submission which you make shall include a certification that the submission has been subjected to your own review and coordination procedures to ensure (a) completeness for each discipline commensurate with the level effort required for that submission, (b) elimination of conflicts, errors, and omissions, and (c) the overall professional and technical accuracy of the submission. Documents which are signficantly deficient in any of these areas will be returned to you for correction and/or upgrading prior to our completing our review.



CONNECTICUT RIVER FLOOD CONTROL

WEST SPRINGFIELD, MASS.

(RIVERDALE DIKE)

LOCAL PROTECTION PROJECT

CONNECTICUT & WESTFIELD RIVERS MASS.

30 JUNE 1963

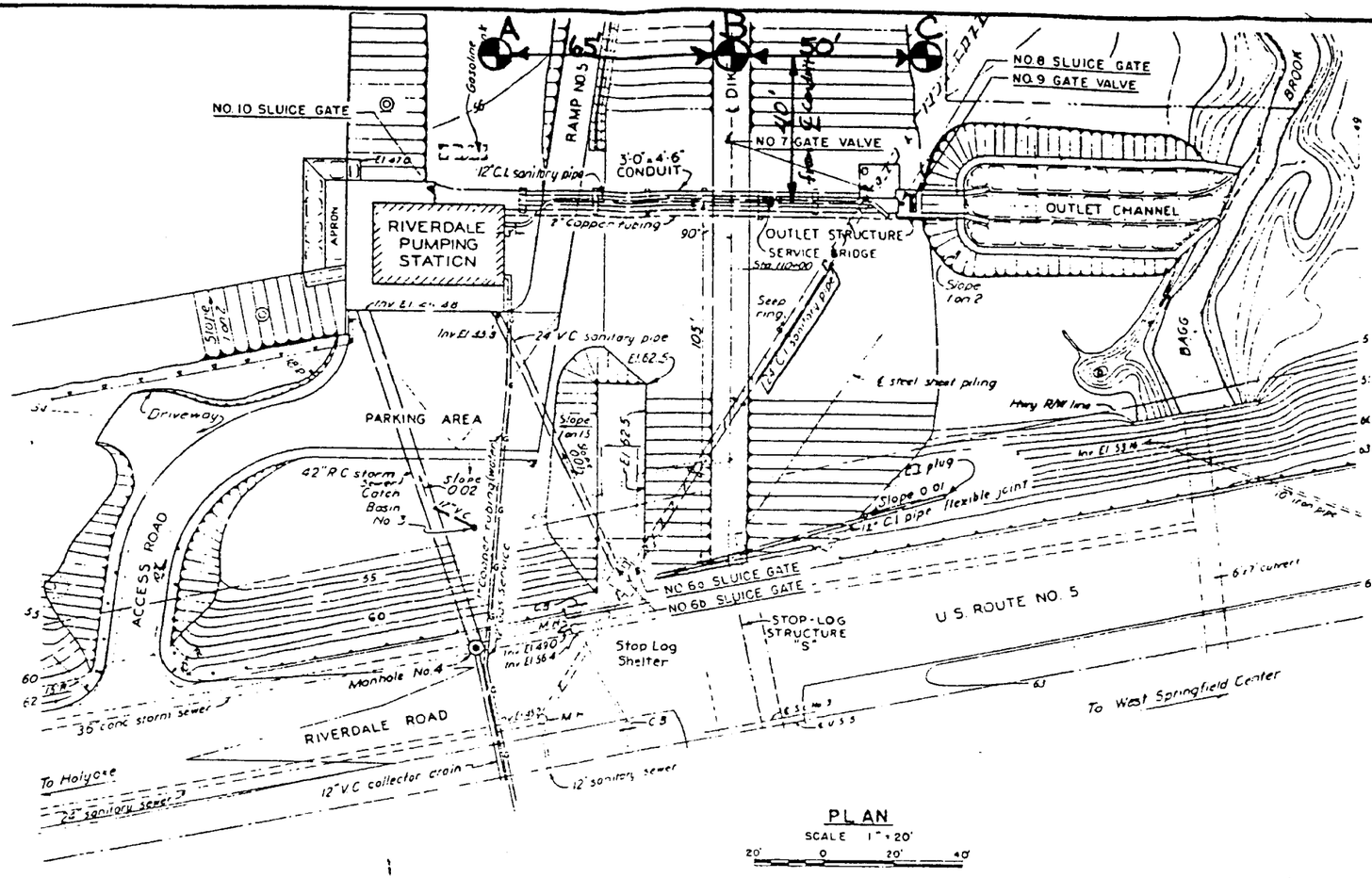
NOT TO SCALE

NEW ENGLAND DIVISION WALTHAM, MASS.

ATTACHMENT 2

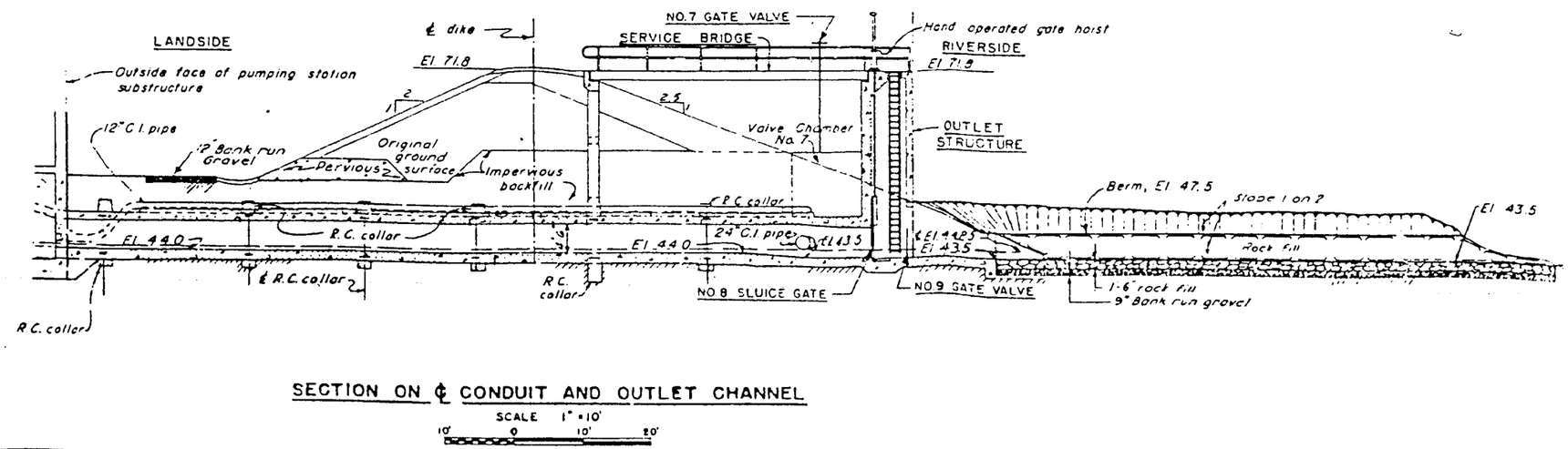
CORPS OF ENGINEERS

U. S. ARMY



PLAN

SCALE 1" = 20'



SECTION ON ℄ CONDUIT AND OUTLET CHANNEL

SCALE 1" = 10'

SITE PLAN

CONNECTICUT RIVER FLOOD CONTROL

RIVERDALE DIKE

WEST SPRINGFIELD, MASS.

GENERAL PLAN

RIVERDALE PUMPING STATION

CONNECTICUT RIVER MASSACHUSETTS

OPERATION AND MAINTENANCE MANUAL

PREPARED BY

CORPS OF ENGINEERS, U. S. ARMY

OFFICE OF THE DIVISION ENGINEER

NEW ENGLAND DIVISION BOSTON, MASS.

DEC. 1950

ATTACHMENT 3

b. Project Site

The site is located on the Riverdale flood control dike in the vicinity of the Riverdale Pumping Station in a privately-owned commercial area of West Springfield, MA. A general project map and a site location map are located in Section 8.

c. Purpose

The subsurface investigations were to provide information on foundation conditions for proposed modifications to the Riverdale Pumping Station.

d. Scope of Work

Inspection and exploration instructions, which were provided by the Army Corps of Engineers, New England Division, are included in Section 3a.

Work under this delivery order consisted of locating three (3) drive sample borings by means of taping the distances given on Attachment No. 3 of the delivery order. The ground elevation at each boring was roughly determined using a hand level, based on the elevation of the top of the outlet structure which was provided in Attachment No. 3.

The explorations were performed in accordance with Paragraph 12 of the contracted "Specifications for Services and Equipment Necessary for Conducting Geotechnical Exploratory Work, Various Locations in New England and New York". Specific instructions and changes during the course of the work were given verbally in telephone conversations with a Corps of Engineers representative and are documented in Section 5.

SECTION 4

QUALITY CONTROL

a. General Certification Statement

I hereby certify that the above mentioned records, equipment and procedures were used to perform the subsurface exploration described herein. I also certify that the work was performed in a professional manner and meets the requirements set forth in the delivery order. This report has been subject to my review and is both complete and technically accurate.

CERTIFIED 9 October 1986

Spencer F. Thew, P.E./L.S.

b. Records Taken

Pertinent drilling procedures, sampling operations and soil classifications were noted on the following forms provided for use by the Corps of Engineers:

NED 121 (Field Log of Test Boring, Summary)
NED 58 and 58a (Field Log of Test Boring)
NED 59 (Subsurface Water Observations and Boring Location Sketch)

A complete series of logs for each of the borings is included in Section 8d.

Sample containers were labeled using ENG Form 1742 and were delivered to the USACE NED Materials and Water Quality Laboratory on October 2, 1986.

A summary of daily activities and a telephone log are Tables I and II of Section 5, respectively. A chain of custody log is in Section 6. The safety meeting report, NED Form 251, including exposure time for Atlantic Testing Laboratories' personnel, is located in Section 7.

c. Equipment Used

All equipment and supplies were provided by Atlantic Testing Laboratories, Limited. A listing of pertinent equipment follows:

- track-mounted CME 45 drill rig
- 3-1/4" I.D. hollow stem augers
- 1-3/8" I.D. split spoon soil samplers, 1.5 and 2.0 ft in length
- AW sized rods used to advance the split spoon sampler
- 5/8" water hose
- 80 gallon tub

d. Procedures

The boring locations in the crest and toe areas of the Riverdale Dike were established by taping the distances given on Attachment No. 3 of the delivery order (Section 3a). Downslope distances for FD-A and FD-C were arrived at by using simple trigonometry to achieve the desired horizontal distance. The actual boring locations (Figure 3, Section 8c) varied only slightly from these specified locations. Elevations for the borings were roughly estimated using a PECO hand level and are based on the elevation of the top of the outlet structure which was provided in Attachment No. 3.

Underground utilities (abandoned sanitary line, active toe drain, gas line, electric and telephone cables, etc.) were located at the site prior to commencing the work.

All three borings were advanced using 3-1/4" I.D. hollow stem augers. Standard penetration testing sampling was accomplished using a 1-3/8" I.D. split spoon sampler advanced by a 140 lb hammer dropping in free fall from a height of 30". Continuous SPT sampling was performed by advancing a 2 ft long, a 1.5 ft long and finally a 1.5 ft long split spoon sampler. After sampling 5 ft, the auger was advanced 5 ft, cleaned out if caving or excess cuttings were encountered while seating the sampler, and the next 5 ft interval of sampling was begun. Refusal was defined as 50 blows without penetration or bouncing refusal. The borings were terminated at the specified depth in the overburden, 50 ft for the boring (FD86-1) on the crest of the dike and 30 ft for the borings (FD86-2 and FD86-3) on the upstream and downstream toes of the dike. The final 5 ft of each boring was accomplished by sampling.

In all cases, the sample spoon shoes were kept reasonably sharp at all times. Dull, bent or otherwise damaged samplers were not used.

The complete sample was saved and placed in 16 oz glass jars with hermetically sealed lids. Samples were classified in the field immediately following the removal of the sample. Classification was in accordance with ASTM D-2488. Jars were labeled using ENG Form 1742 provided by the Corps of Engineers. A chain of custody log was maintained documenting custody of the samples between Atlantic Testing Laboratories and the Corps of Engineers. The samples were delivered to the USACE NED Materials and Water Quality Laboratory on October 2, 1986.

Following completion of the boring, the augers were removed gradually while backfilling the bore hole with bentonite cement grout to a depth of 6" below the surface. This proved to be a difficult operation as the grout disappeared into a permeable sandy stratum intersected by all three borings. Borings FD86-1 and FD86-2 were filled completely with the grout twice on the day they were drilled. After solidifying overnight both borings were filled a third time which was successful. FD86-3 was also filled completely with the grout twice on the day it was drilled. The Corps of Engineers then changed the instructions to allow for backfilling the remainder of FD86-3 with on-site soils. This should not create adverse conditions as the walls of the boring have been rendered largely impermeable by the grout. The top 6" of all three borings were filled with topsoil and tamped.

SECTION 5

SUMMARY OF ACTIVITIES
AND
TELEPHONE LOG

TABLE I

Summary of Activities

Date	Activity
30 September	Tuesday: on-site 16:30-21:00 - Staked out boring locations using simple trigonometry to arrive at the proper taped slope distance to achieve the desired horizontal distance. - Clear utilities. - Gather safety meeting information. - Stand by time, 1 hour, during utility clearance.
1 October	Wednesday: on-site 6:30-18:30 - Complete FD86-1(B) on crest of dike. - Note difficulty in grouting hole. Encountered sandy soils which were quite permeable and the hole took a great deal of grout. Last fill of boring was in the uncased hole. Decided to let what we had set up which would render the sides of the hole relatively impermeable. - Ed Pajak, dike foreman, was on-site. Located toe drain and abandoned sewer line, completing utility clearance. - Complete FD86-2(A) on northern toe of the dike. Grouting procedure was only slightly more successful. - Hold safety meeting. - Stand by time, 2 hours for on-site moves and safety meeting.
2 October	Thursday: on-site 6:30-13:00 - Succeed in grouting FD86-1 and FD86-2 to 6" below the surface. - Complete FD86-3(C) on southern toe of dike. Grouting procedure as difficult as before. - Deliver samples to USACE NED in Waltham, MA. - Demobilize drill crew and equipment. - Stand by time, 1 hour, for on-site moves.
6 October	Monday - Backfill FD86-3 with on-site soils. - Landscape all three borings, tamping topsoil in the last 6" and spreading the remaining soils cleanly over the site.

TABLE II

Telephone Log

Date	Conversation
1 October	Wednesday: Paul L'Heureux - Permission granted to use 3-1/4" I.D. hollow stem augers as long as we are certain to grout the hole closed.
1 October	Wednesday: Ed Pajak - Granted permission to spread the dirt from the borings over the lawn surface.
2 October	Thursday: Paul L'Heureux - Will finish last hole this morning and will bring samples to Waltham this afternoon. - Regarding the problem of grouting, if all else fails, we will mix in some on-site soils in an attempt to thicken it. - Will be leaving the rig in West Springfield, MA, over the weekend. Will finish landscaping the holes on Monday when we pick up the rig.
2 October	Thursday: Ed Pajak - Landscaping of the holes on Monday is acceptable as long as the holes are covered with something over the weekend. - Asked us to leave the rig at the Town barns as that is fenced in.
2 October	Thursday: John Hart, Tim Beauchemin - Recommended that FD86-3 be backfilled with on-site soils instead of regrouting it.
2 October	Thursday: Paul L'Heureux - Not necessary to submit an additional safety meeting report to cover next week's exposure hours.

SECTION 6

CHAIN OF CUSTODY LOG

ATLANTIC TESTING LABORATORIES, Limited

CHAIN OF CUSTODY LOG

PROJECT: Riverdale Dike, West Springfield MA
D.O.# 0016

ITEMS:

Tubes: none

Bottles: none

Jar Samples: 6 boxes, 120 jars

Core Boxes: none

Sampling Logs: 3 logs

Date & Time Received	Date & Time Transferred	Comments	Custodian
10/1/86 as sampled			Theresa A. Beddoe
10/2/86 2:30			Joseph D. Colucci

SECTION 7

SAFETY REPORT

WEEKLY SAFETY MEETING

NEDSO

Date held 10/1/86

THRU: Area Engineer, New England Area

Time 12:00

TO: Safety Office, NED

Report No. CD018

1. Weekly safety meeting was held this date for the following personnel:

Contract No. /D.O.No. 0016

Contractor Atlantic Testing Laboratories, Ltd.

Conducted By TABeddoe

All personnel present (Contr) 3
(Sub) 2
(Govt) 0

Subjects discussed (Note, delete, or add):
EM 385-1-1, Section: _____

✓ Accident Prevention Plan

✓ Individual Protective Equipment - gloves, hard hats

✓ Prevention of Falls -

✓ Back Injury, Safe Lifting Techniques -

✓ Fire Prevention - locate fire extinguisher on rig and in pumphouse

✓ Sanitation, First Aid, Waste Disposal - check condition of first aid kit

✓ Tripping Hazards - trash, hose, nails in lumber - slick grassy slopes

Staging, Ladders, Concrete Forms, Safety Nets -

Hand Tools, Portable Power Tools, Woodworking Machinery -

✓ Equipment Inspection & Maintenance (Zero Defects) - esp. gin rope, wire cable

Hoisting Equipment -

✓ Ropes, Hooks, Chains and Slings -

Electrical Grounding, Temporary Wiring, GFCI -

Lockouts for safe clearance procedures - electrical, pressure, moving parts -

Welding, Cutting -

Excavations -

✓ Loose Rock and Steep Slopes -

Explosives -

Water Safety -

Toxic materials - hazards, MSDS, respiratory, ventilation -

Other - Fire 732-4141
Police + Ambulance 732-7421
Providence Hospital
Straight N on Rt 5

Prepared by TABeddoe Title Geologist

2. Forwarded.

Signature Theresa A. Beddoe
Resident Engineer

CF: EXPOSURE HOURS:
Work Date: 9/30, 10/1, 10/2
Non-work Date: 9/28, 10/3, 10/4

Man Hours:
Contr: 61.0
Subcontr: _____
Govt: _____
TOTAL: 61.0

NED APR FL 251

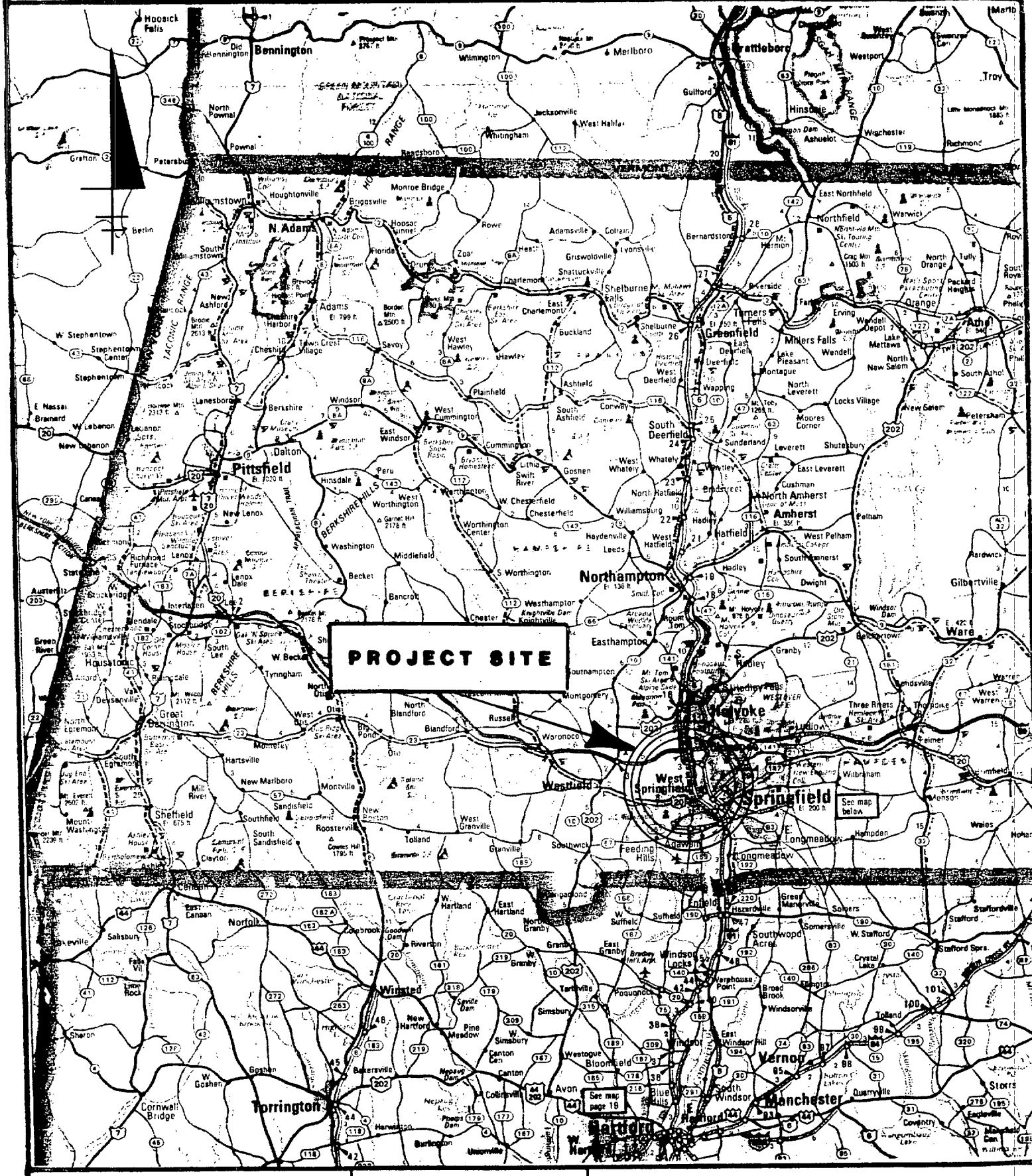
SECTION 8

BORING LOGS

a. **Figure 1 - General Project Map**

FIGURE 1

GENERAL PROJECT MAP

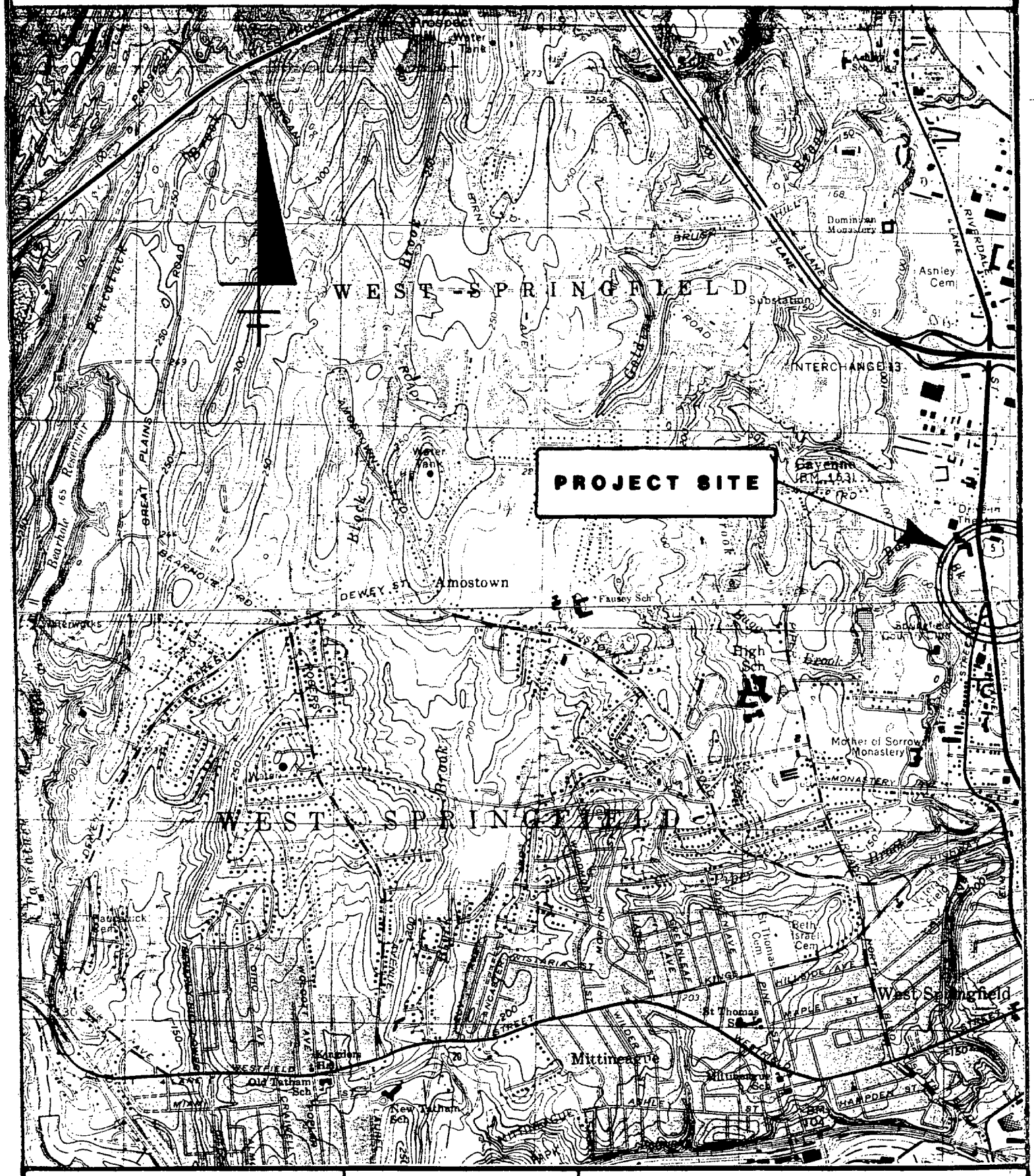


PROJECT No	SCALE:	
CD018	1" = 9 mi.	MASSACHUSETTS

b. **Figure 2 - Site Location Map**

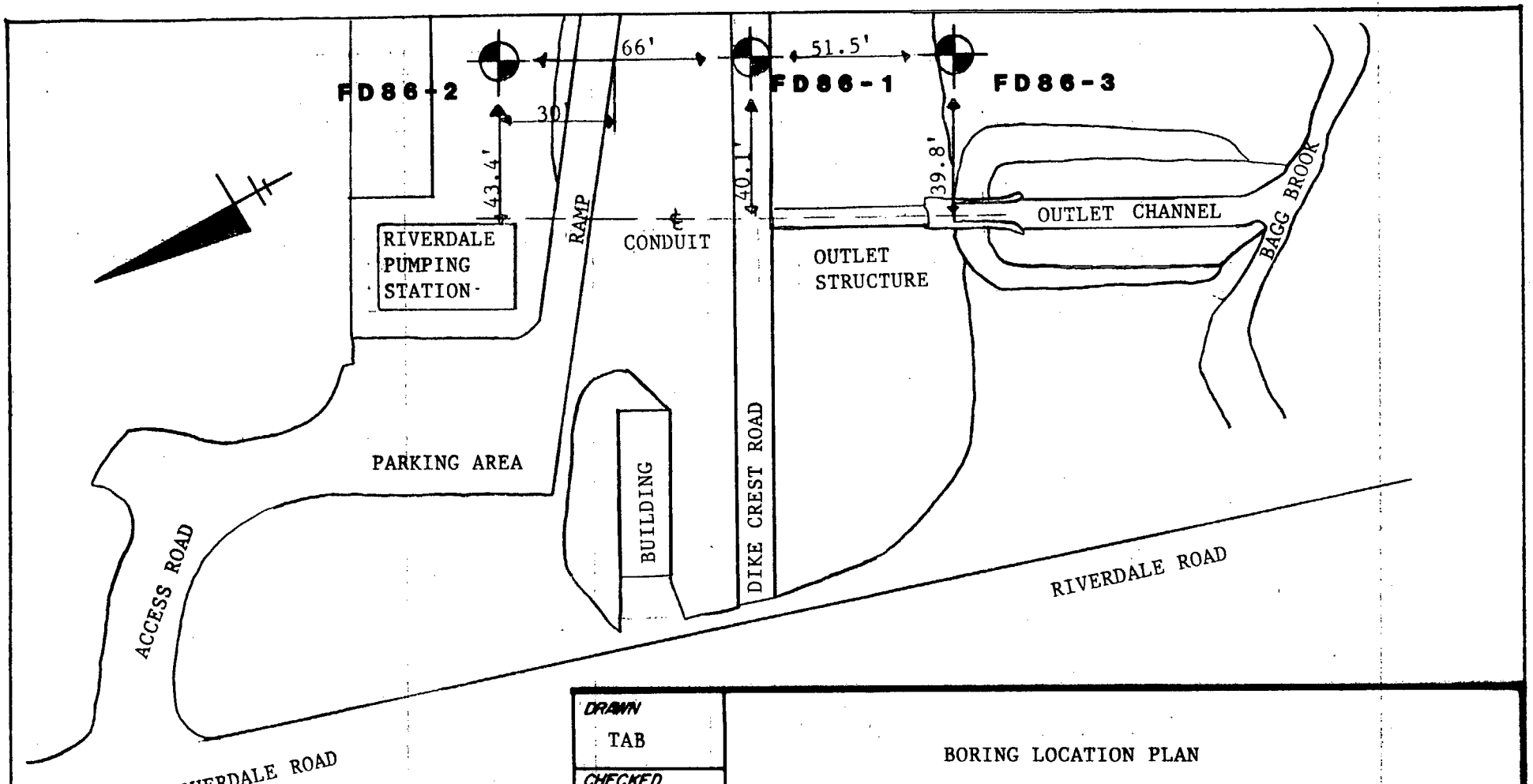
FIGURE 2

SITE LOCATION MAP



PROJECT No CD018	***SCALE:*** 1:25,000	***U.S.G.S. QUAD:*** Mount Tom, Mass. West Springfield, Mass.

c. Figure 3 - Boring Location Plan



DRAWN: TAB	BORING LOCATION PLAN RIVERDALE DIKE
CHECKED: TAB	
SCALE: 1" = 40'	WEST SPRINGFIELD, MASSACHUSETTS
DATE: 10/8/86	ATLANTIC TESTING LABORATORIES, Limited
DRWNG. NO. Figure 3	P.O. BOX 29, CANTON, NEW YORK (315) 386-4578 CICERO, N.Y. ENDICOTT, N.Y. BURLINGTON, VT. MANCHESTER, N.H.

d. Boring Logs

CORPS OF ENGINEERS, U. S. ARMY
NEW ENGLAND DIVISION
FOUNDATION AND MATERIALS BRANCH

FIELD LOG OF TEST BORING

PROJECT NO. D.O. #0016

Site Riverdale Dike, West Springfield, MA — Page 1 of 6 Pages

Hole No. FD86-1 Diam. (Casing) 3¼" Hollow Stem Auger — Boring Started 10/1/86

Co-ordinates: X see X plan — Boring Completed 10/1/86

Drilled by Davis and Murdock — Report Submitted 10/9/86

Purpose of Exploration subsurface investigation to facilitate modifications to the Riverdale Pumping Station

Elevation Top of Hole 71.8 M.S.L. — Casing Left in Place — Feet

Total Overburden Drilled 50.0 Feet

Elevation Top of Rock — M.S.L.

Elevation Bottom of Hole 31.8 M.S.L.

Total Rock Drilled 0.0 Feet

Total Depth of Hole 50.0 Feet

Core Recovered — %

Core Recovered — Ft.; — Diam. — in.

Soil Samples 1 3/8 in. Diam. 33 No.

Soil Samples — in. Diam. — No. — Water Table Depth 35.0'

Depth From	Depth To	Method of Drilling and Type of Bit Used
0.0	45.0	3¼" ID Hollow Stem Auger
45.0	50.0	1 3/8" ID Split Spoon Sampler

INDEX

Prepared by Theresa A. Beddoe — Field Data — Lab. Data

Submitted by Atlantic Testing Labs, Ltd.

NED FORM DEC 63 121 — REPLACES EDITION OF JUN 51 WHICH MAY BE USED UNTIL EXHAUSTED

U.S. ARMY
CORPS OF ENGINEERS
NEW ENGLAND DIVISION

FIELD LOG OF TEST BORING

Site Riverdale Dike, West Springfield, MA. Page 2 of 6 Pages

Boring No. ED86-1 Desig. B Diam. (Casing) 3¼" Hollow Stem Auger

Co-ordinates: X see boring X location plan

Elevation Top of Boring 71.8 * M.S.L. Hammer Wt. 140# Boring Started 10/1/86

Total Overburden Drilled 50.0 Feet Hammer Drop 30" Boring Completed 10/1/86

Elevation Top of Rock — M.S.L. Casing Left —

Total Rock Drilled 0.0 Feet Subsurface Water Data — Page 6

Elevation Bottom of Boring 31.8 M.S.L. Obs. Well —

Total Depth of Boring 50.0 Feet Drilled By Davis-E Murdock

Core Recovered — % No. Boxes — Mfg. Des. Drill track mounted CME 45

Core Recovered — Ft. — Diam. — In. Inspected By: TABeddoe

Soil Samples 1 3/8 In. Diam. 33 No. Classification By: TABeddoe

Soil Samples — In. Diam. — No. Classification By: —

DEPTH 0'	DEPTH 1"=2'	CORE/SAMPLE NO.	SIZE	DEPTH RANGE / REC	BLOWS PER FT. / CORE RECVY	6" SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
				REC	6	Sample using 1 3/8" ID split spoon sampler; Advance 3¼" ID Hollow Stem Auger to 2.0'	8" TOPSOIL Med. Brown SAND, some fine GRAVEL, trace SILT, trace ORGANICS (roots, twigs) (dry, non plastic) loose SP
		S-1	1 3/8"	65%	13		
2.0'					25		
					20		
		S-2	1 3/8"	80%	14	Sample	Similar Soils with little fine GRAVEL SP
3.5'					21		
					18		
		S-3	1 3/8"	100%	14	Sample	Soils Similar to S-2 (moist) SP
					18		
5.0'					16	Auger to 5.0'	
		S-4	1 3/8"	75%	8	Sample	Soils Similar to S-3 SP
					15		
					15		
7.0					16		
		S-5	1 3/8"	60%	10	Sample	Med. Brown SAND, little SILT, trace f. GRAVEL (moist, nonplastic) loose SM
					13		
8.5					13		
		S-6	1 3/8"	35%	12	Sample	Similar Soils - SM
					14		
10.0					15	Auger to 10'.	

GENERAL REMARKS:
* elevation from Attachment #3 of D.O. #0016

Site: Riverdale Dike, W. Springfield, MA | Boring No. FD86-1 | Page 3 of 6

DEPTH (10')	DEPTH (1":2')	CORE/SAMPLE NO.	CORE/SAMPLE SIZE	CORE/SAMPLE REC.	BLOWS PER 6"	6" SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
				REC	8	Sample using 1 3/8" ID split spoon sampler	Med. Brown SILT and SAND, trace fine GRAVEL (moist, nonplastic) soft ML
		S-7	1 3/8"	100%	8		
					10		
12.0					11		
		S-8	1 3/8"	60%	10	Sample	Similar Soils ML
					14		
13.5					14		Similar Soils ML
		S-9A			12	Sample	
			1 3/8"	85%	11		Med. Grey-Brown SILT, some fine SAND, trace - fine GRAVEL (moist, nonplastic) ~~soft~~ ML
		S-9B			18	Advance 3 1/4" ID Hollow stem Auger to 15.0'	
15.0							
					10	Sample	Similar Soils with one piece coarse GRAVEL, ML
		S-10	1 3/8"	20%	10		
					12		
17.0					15		
					10	Sample	Similar Soils, no coarse GRAVEL - ML
		S-11	1 3/8"	90%	14		
18.5					17		
					5	Sample	Med. Grey brown mf SAND and SILT, trace fine GRAVEL (moist, nonplastic) loose SM
		S-12	1 3/8"	80%	12		
20.0					16	Auger to 20.0'	
					5	Sample	Med. Brown fine SAND, little SILT (moist, nonplastic) loose SM
		S-13	1 3/8"	80%	5		
22.0					5		
		S-14	1 3/8"	65%	WOR	Sample	Similar Soils SM
23.5							
		S-15	1 3/8"	75%	WOR	Sample	Similar Soils SM
25.0						Auger to 25.0'	
					3	Sample	Similar Soils - wet SM
		S-16	1 3/8"	100%	4		
					5		
27.0					8		

FORM 58A (Test)

Site: Riverdale Dike, W. Springfield MA | Boring No. FD86-1 | Page 4 of 6

DEPTH		CORE/SAMPLE NO.	SIZE	DEPTH SAMPLED OR CORED	BLOWS PER 6" CORE RECOVERY	6" SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
27.0	1'-2'			REC		Sample using 1 3/8" ID Split Spoon Sampler	Similar Soils, saturated SM
		S-17	1 3/8"	100%	WOR		
30.0						Advance 3 1/4" ID hollow stem Auger to 30.0'	
		S-18	1 3/8"	100%	2, 2, 5, 4	Sample	Medium Grey Similar Soils with trace ORGANICS (wood) SM
32.0							
		S-19	1 3/8"	100%	4, 9, 14	Sample	Similar Soils, no ORGANICS, one piece fine GRAVEL SM
33.5							
		S-20	1 3/8"	100%	4, 9, 9	Sample Water level measured at 35.0' Auger to 35.0'	Similar Soils, no GRAVEL SM
35.0							Similar Soils SM
		S-21A / S-21B	1 3/8"	100%	4, 5, 8, 9	Sample	Med. Brown to Rust m-f SAND, trace fine GRAVEL, trace SILT (sat., nonpl) loose SP
37.0							
		S-22	1 3/8"	100%	3, 6, 13	Sample	Med. Br. to Rust m-f SAND, trace SILT (sat, nonpl.) loose SP
38.5							
		S-23	1 3/8"	100%	2, 4, 4	Sample Auger to 40.0'	Similar Soils SP
40.0							
		S-24A / S-24B	1 3/8"	100%	11, 10, 9, 7	Sample	Similar Soils SP [with one lenscap of Med. rust brown SILT and m-f SAND, trace CLAY (sat., v.sl. pl) SM]
42.0							Med. rusty grey SILT, trace CLAY, trace f SAND (sat., v slightly plastic) soft ML
		S-25	1 3/8"	100%	6, 8, 9	Sample	Med. rusty grey SILT, little f. SAND (sat., nonpl) soft ML
43.5							
		S-26	1 3/8"	100%	4/8/13	Sample	Similar Soils - ML

FORM 58A (Test)

Boring No. FD86-1

Site				Boring No.		Page 5 of 6
Riverdale Dike, W. Springfield MA				FD86-1		

DEPTH 44.0	1"=2'	CORE/SAMPLE NO.	SIZE	DEPTH RANGE / DEC	BLOWS PER 6" / CORE RECOV'Y	6" SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
45.0		S-26	1 3/8"	100%	4/8/13	Advance 3 1/4" ID Hollow Stem Auger to 45.0'.	Similar Soils - ML
47.0		S-27	1 3/8"	100%	6 10 13 18	Sample using 1 3/8" ID Split Spoon Sampler	Similar Soils - ML
48.5		S-28	1 3/8"	65%	11 18 20	Sample	Similar Soils - ML
50.0		S-29	1 3/8"	75%	4 5 8	Sample	Similar Soils - ML
						Boring Terminated at 50.0'.	

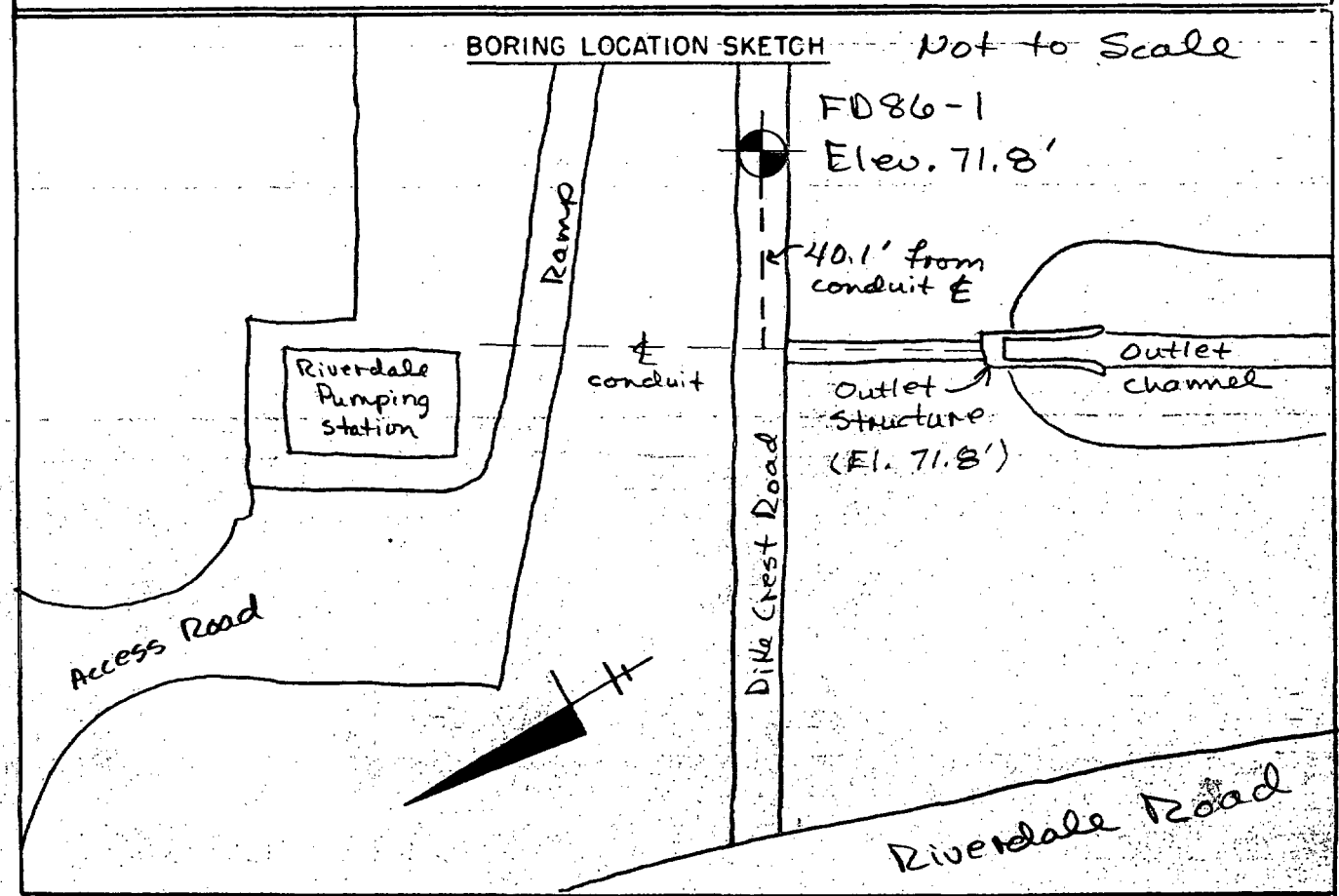
Site: Riverdale Dike, West Springfield, MA
Boring No: FD86-1

SUBSURFACE WATER OBSERVATIONS

DATE	TIME	DEPTH-BOT. OF CASING	DEPTH-BOT. OF BORING	DEPTH TO WATER	ELEVATION WATER	REMARKS
10/1/86	11:10	45.0'	50.0'	35.0'	36.8'	after boring termination

Note: Depths are in feet below original ground

BORING LOCATION SKETCH — Not to Scale



CORPS OF ENGINEERS, U. S. ARMY
NEW ENGLAND DIVISION
FOUNDATION AND MATERIALS BRANCH

FIELD LOG OF TEST BORING

PROJECT NO. D.O. #0016

Site Riverdale Dike, W. Springfield, MA — Page 1 of 5 Pages

Hole No. ED86-2 Diam. (Casing) 3¼" ID Hollow Stem Auger — Boring Started 10/1/86

Co-ordinates: ~~X~~ see ~~Y~~ plan — Boring Completed 10/1/86

Drilled by Davis and Murdock — Report Submitted 10/9/86

Purpose of Exploration subsurface investigation to facilitate modifications to the Riverdale Pumping Station

Elevation Top of Hole 55.3* M.S.L. — Casing Left in Place — Feet

Total Overburden Drilled 30.0 Feet

Elevation Top of Rock — M.S.L.

Elevation Bottom of Hole 25.3 M.S.L.

Total Rock Drilled 0.0 Feet

Total Depth of Hole 30.0 Feet

Core Recovered — %

Core Recovered — Ft.; — Diam. — In.

Soil Samples 1 3/8 In. Diam. 21 No.

Soil Samples — In. Diam. — No.

Water Table Depth 14.7'

* estimated using hand level from top of outlet structure (El. 71.8')

Depth From	Depth To	Method of Drilling and Type of Bit Used
0.0	25.0	3¼" ID Hollow Stem Auger
25.0	30.0	1 3/8" ID Split Spoon Sampler

INDEX

Prepared by TAB eddoes — Field Data — Lab. Data

Submitted by Atlantic Testing Labs, Ltd

NED FORM DEC 63 121 — REPLACES EDITION OF JUN 51 WHICH MAY BE USED UNTIL EXHAUSTED

U. S. ARMY
CORPS OF ENGINEERS
NEW ENGLAND DIVISION

FIELD LOG OF TEST BORING

Site Dwarf Dike, W. Springfield MA Page 2 of 5 Pages

Boring No. ED86-2 Desig. A Diam. (Casing) 3¼" ID Hollow Stem Auger

Co-ordinates: X see boring X location plan

Elevation Top of Boring 55.3* M.S.L. Hammer Wt. 140# Boring Started 10/1/86

Total Overburden Drilled 30.0 Feet Hammer Drop 30" Boring Completed 10/1/86

Elevation Top of Rock — M.S.L. Casing Left —

Total Rock Drilled 0.0 Feet Subsurface Water Data — Page 5

Elevation Bottom of Boring 25.3 M.S.L. Obs. Well no

Total Depth of Boring 30.0 Feet Drilled By Davis & Murdock

Core Recovered — % No. Boxes — Mfg. Des. Drill Track mounted CME 45

Core Recovered — Ft. — Diam. — In. Inspected By: TABeddoe

Soil Samples 1 3/8 In. Diam. 21 No. Classification By: TABeddoe

Soil Samples — In. Diam. — No. Classification By: —

DEPTH	CORE/SAMPLE NO.	SIZE	DEPTH RANGE	% CORE REC'VY	BLOWS PER 6"	6" SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
0.0'	S-1A		REC		12	Sample using 1 3/8" ID Split Spoon Sampler	0.5' Topsoil with ½" layer FINE GRAVEL
	S-1B	1 3/8"		80%	18		Med. Brown mf. SAND and SILT (moist, nonplastic) loose SM
					18		
2.0					19		
	S-2	1 3/8"		75%	12	Sample	Med. Brown SILT, trace f. SAND, trace f. GRAVEL (moist, nonplastic) soft ML
					18		
3.5					19		
	S-3	1 3/8"		65%	8	Sample	Similar Soils - ML (no gravel)
					4		
5.0					4	Advance 3¼" ID Hollow Stem Auger to 5.0'	
	S-4	1 3/8"		100%	2	Sample	Similar Soils ML
					2		
					2		
7.0					2		
	S-5	1 3/8"		60%	3	Sample	Similar Soils - ML (wet)
					2		
8.5					2		
	S-6	1 3/8"		100%	2	Sample	Similar Soils ML
					1		
10.0					2	Auger to 10.0'	

GENERAL REMARKS:
* elevation estimated using hand level from top of outlet structure (El. 71.8')

Site: Riverdale Dike, W. Springfield, MA

Boring No. FD86-2

DEPTH		CORE/SAMPLE			BLOWS PER 1ST 6" CORE RECVY	6" SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
10.0	1' 2"	NO.	SIZE	DEPTH RECOVERY			
				REC	2	Sample using 1 3/8" ID split spoon sampler	Similar Soils (some f. SAND) ML
		S-7	1 3/8"	75%	2		
					2		
12.0					3		
		S-8	1 3/8"	65%	1	Sample	Similar Soils ML
					3		
13.5					3		
		S-9	1 3/8"	100%	2	Sample	Similar Soils (and fine SAND) ML
					2	Water Level measured at 14.7'	
15.0					2	Advance 3 1/4" ID Hollow Stem Auger to 15.0'	
		S-10	1 3/8"	100%	2	Sample	Med brown changing to grey at 18' Similar Soils ML (saturated)
					1		
					1		
17.0					1		Grey Similar Soils ML
		S-11A			3	Sample	Med. Brown to rust m & SAND, trace SILT (sat.; nonpl.) loose SP
		S-11B	1 3/4"	80%	5		
18.5					6		
		S-12	1 3/8"	100%	3	Sample	Similar Soils - SP
					5		
20.0					6	Auger to 20.0'	
		S-13	1 3/8"	55%	1	Sample	Med. grey brown Similar Soils SP
					4		
					5		
22.0					6		
		S-14	1 3/8"	100%	4	Sample	Similar Soils - SP
					7		
23.5					8		
		S-15	1 3/8"	100%	3	Sample	Similar Soils - SP with one vertical seam of Med. grey SILT, trace f. SAND
					5		
25.0					7	Auger to 25.0	
		S-16A	1 3/8"	100%	1	Sample	Similar Soils - SP with trace MF GRAVEL
					2		
					5		Medium rusty grey SILT, trace CLAY, trace f. SAND (sat., very slightly plastic) soft ML
27.0		S-16B			5		

Site	Boring No.	Page
Riverdale Dike, W. Springfield MA	FD86-2	4 of 5

DEPTH		CORE/SAMPLE			BLOWS PER 6"	6" SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
27.0	1" = 2'	NO.	SIZE	DEPTH / RECOVERY / CORE RECVY			
				REC	4	Sample using 1 3/8" ID Split Spoon Sampler	Similar Soils ML (note organics are from surface contamination of sample when the spoon was opened) Med. Mushy grey SILT, trace fine SAND (soft, nonplastic) med. soft ML
		S-17	1 3/8"	5%	6		
28.5					6		
		S-18	1 3/8"	46%	9	Sample	
					23		
30.0					36		
						Boring Terminated at 30.0'	

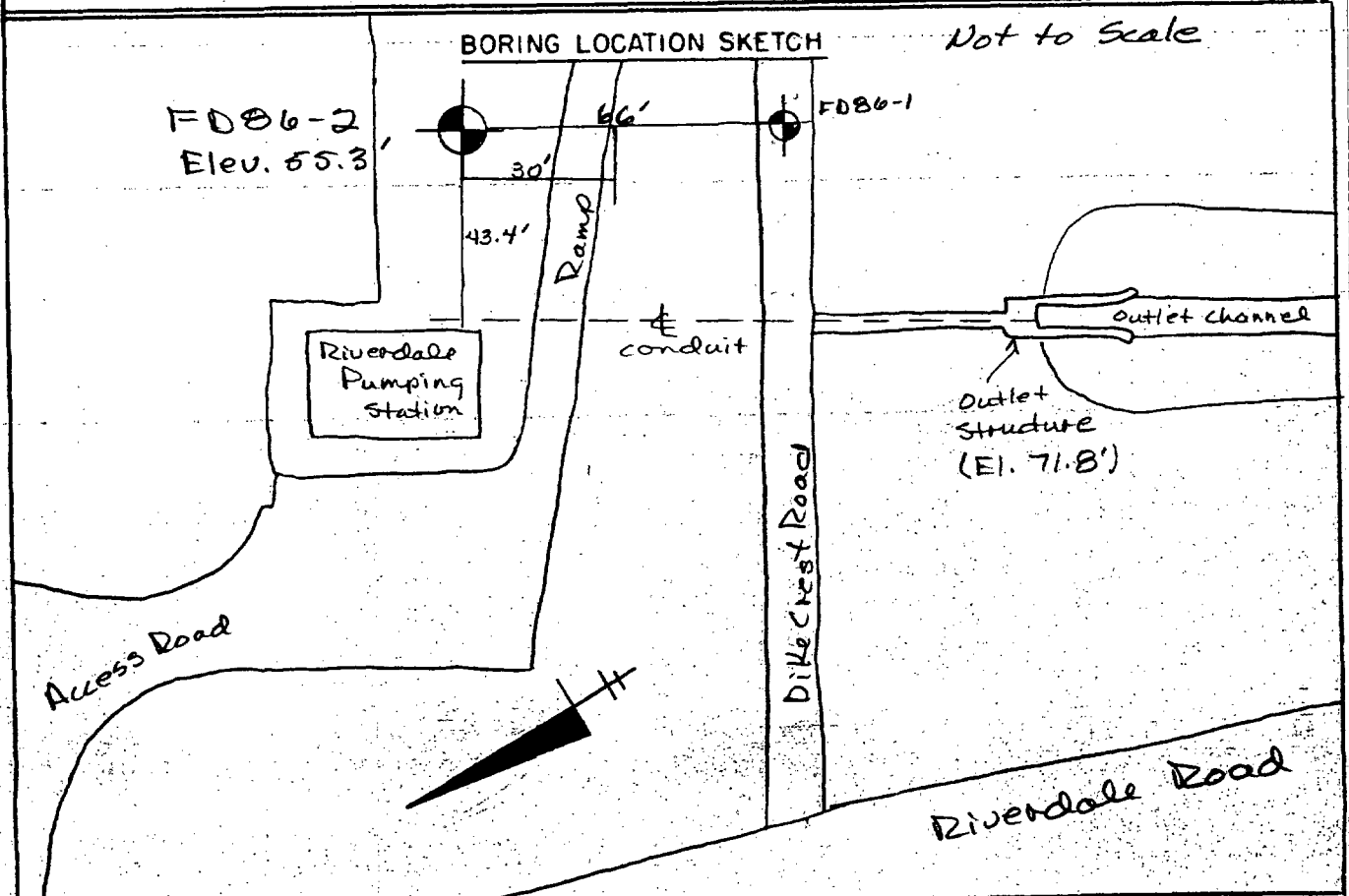
Site: Riverdale Dike, W. Springfield MA
Boring No: FD86 - 2

SUBSURFACE WATER OBSERVATIONS

DATE	TIME	DEPTH-BOT. OF CASING	DEPTH-BOT. OF BORING	DEPTH TO WATER	ELEVATION WATER	REMARKS
10/1/86	15:45	25.0'	30.0'	14.7'	40.6'	after boring termination

Note: Depths are in feet below original ground

BORING LOCATION SKETCH



CORPS OF ENGINEERS, U. S. ARMY
NEW ENGLAND DIVISION
FOUNDATION AND MATERIALS BRANCH

FIELD LOG OF TEST BORING

PROJECT NO. D.O. #0016

Site Riverdale Dike, W. Springfield, MA — Page 1 of 5 Pages

Hole No. FDBH-3 Diam. (Casing) 3¼" Hollow Stem Auger — Boring Started 10/2/86

Co-ordinates: ~~N~~ see ~~E~~ plan — Boring Completed 10/2/86

Drilled by Davis & Murdock — Report Submitted 10/9/86

Purpose of Exploration subsurface investigation to facilitate modifications to the Riverdale Pumping Station

Elevation Top of Hole 51.8* M.S.L.
Total Overburden Drilled 30.0 Feet
Elevation Top of Rock — M.S.L.
Elevation Bottom of Hole 21.8 M.S.L.
Total Rock Drilled 0.0 Feet
Total Depth of Hole 30.0 Feet
Core Recovered — %
Core Recovered — Ft.; — Diam. — in.
Soil Samples 1 3/8 in. Diam. 19 No.
Soil Samples — in. Diam. — No.

Casing Left in Place — Feet

* elevation estimated using hand level from top of outlet structure (El. 71.8')

Water Table Depth 15.5'

Depth From	Depth To	Method of Drilling and Type of Bit Used
0.0	25.0	3¼" Hollow Stem Auger
25.0	30.0	1 3/8" ID Split Spoon Sampler

INDEX

Prepared by TABeddor (Field Data) — (Lab. Data)

Submitted by Atlantic Testing Labs, Ltd

NED FORM DEC 63 121 REPLACES EDITION OF JUN 51 WHICH MAY BE USED UNTIL EXHAUSTED

U.S. ARMY
CORPS OF ENGINEERS
NEW ENGLAND DIVISION

FIELD LOG OF TEST BORING

Site Riverdale Dike, W. Springfield, MA Page 2 of 5 Pages

Boring No. FD86-3 Desig. C Diam. (Casing) 3¼" Hollow Stem Auger

Co-ordinates: X see boring X location plan

Elevation Top of Boring 51.8* M.S.L. Hammer Wt. 140# Boring Started 10/2/86

Total Overburden Drilled 30.0 Feet Hammer Drop 30" Boring Completed 10/2/86

Elevation Top of Rock — M.S.L. Casing Left —

Total Rock Drilled 0.0 Feet Subsurface Water Data — Page 5

Elevation Bottom of Boring 21.8 M.S.L. Obs. Well no

Total Depth of Boring 30.0 Feet Drilled By Davis & Murdock

Core Recovered — % No. Boxes — Mfg. Des. Drill Track-mounted CME 45

Core Recovered — Ft : — Diam. — in. Inspected By: TABeddoe

Soil Samples 1 3/8 in. Diam. 19 No. Classification By: TABeddoe

Soil Samples — in. Diam. — No. Classification By: —

DEPTH	CORE/SAMPLE NO.	SIZE	DEPTH RANGE	BLOWS PER 6" CORE RECVY	6" SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
0.0' 1" = 2'			REC	2	Sample using 1 3/8" ID Split Spoon Sampler	2" TOPSOIL Med brown SILT, little cmf SAND, trace f. GRAVEL, trace ORGANICS (roots) (moist, non-plastic) soft ML
2.0'	S-1	1 3/8"	65%	5 5 6		
3.5'	S-2	1 3/8"	80%	4 4 4	Sample	Light brown SILT, some fine SAND (moist, non plastic) soft ML
5.0'	S-3	1 3/8"	75%	3 4 4	Sample Advance 3¼" ID Hollow Stem Auger to 5.0'	Similar Soils ML Similar Soils ML
7.0'	S-4	1 3/8"	70%	3 2 2 2	Sample	Similar Soils ML (wet at bottom of spoon)
8.5'	S-5	1 3/8"	100%	3 3 3	Sample	Dark grey-brown with rust mottling Similar Soils ML (saturated)
10.0'	S-6	1 3/8"	100%	3 2 3	Auger to 10.0'	

GENERAL REMARKS:

* elevation estimated using hand level from top of outlet structure (El. 71.8')

Site: Riverdale Dike, W. Springfield MA

Boring No. FD86-3

Page 3 of 3

DEPTH		CORE/SAMPLE NO.	CORE/SAMPLE SIZE	CORE/SAMPLE DEPTH & CORE RECOVERY	BLOWS PER 6"	6" SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
10.0'	to 21'						
		S-7	1 3/8"	75%	3 1 3 1	Sample using 1 3/8" ID Split Spoon Sampler	Similar Soils ML
12.0'							
		S-8	1 3/8"	50%	3 1 3	Sample	Med. grey & brown Similar Soils ML
13.5'							
		S-9	1 3/8"	80%	3 1 4	Sample Advance 3 1/4" ID Hollow Stem Auger to 15.0'	Dark Grey Similar Soils ML
15.0'							
		S-10	1 3/8"	100%	3 2 3 9	Sample	Dark Grey with iron staining Similar Soils ML with layers of Med. brown to rust mf SAND, trace SILT (sat, nonplastic) loose SP
17.0'							
		S-11	1 3/8"	100%	4 7 11	Sample	Med. brown to rust mf SAND, trace SILT, one piece f. GRAVEL (sat, nonpl) loose SP
18.5'							
		S-12	1 3/8"	100%	4 8 9	Sample	Similar Soils SP
20.0'						Auger to 20.0'	
		S-13	1 3/8"	50%	3 3 7 14	Sample	Med. Grey brown Similar Soils SP
22.0'							
		S-14A	1 3/8"	100%	10 25 23	Sample	similar soils SP
23.5'		S-14B					Med. rust brown SAND and mf GRAVEL, trace SILT (sat, nonpl) med. loose SP
		S-15	1 3/8"	100%	6 6 12	Sample	Soils Similar to S-14A with trace f. GRAVEL SP
25.0'						Auger to 25.0'	
		S-16	1 3/8"	100%	8 11 11 11	Sample	Similar Soils SP changing at bottom (26.8') to soils similar to S-17 ML
27.0'							ML (see S-17)

ENG 358A (Test)

Boring No. FD86-3

Site: Riverdale Dike, W. Springfield, MA

Boring No. FD86-3

DEPTH		CORE/SAMPLE			BLOWS PER FT COVERY	6" SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
27.0'	1'-2'	NO.	SIZE	DEPTH/REC			
		S-17	1 3/8"	REC 75%	5 7 8	Sample using 1 3/8" ID split spoon sampler	Rust SILT, little fine SAND trace CLAY (sad., very slightly plastic) ~~soft~~ ML
28.5'							
		S-18	1 3/8"	100%	7 17 21	sample	Similar soils ML
30.0							
						Boring terminated at 30.0'	

Site: Riverdale Dike, W. Springfield MA
Boring No: FD86-3

SUBSURFACE WATER OBSERVATIONS

DATE	TIME	DEPTH-BOT. OF CASING	DEPTH-BOT. OF BORING	DEPTH TO WATER	ELEVATION WATER	REMARKS
10/8/86	10:10	25.0'	30.0'	15.5'	36.3'	after boring termination

Note: Depths are in feet below original ground

BORING LOCATION SKETCH Not to Scale